[0035] Figure 15 is a flowchart illustrating an exemplary method of stabilizing the extinction ratio of an exemplary tunable EAM with electro-optical taps according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0036] One embodiment of the present invention is a monolithic transmissive active optical device, illustrated in Figures 1A-C, such as an electroabsorption modulator (EAM), a variable optical attenuator (VOA), or a semiconductor optical amplifier (SOA), with input and output optical taps. Another embodiment includes mode expansion/contraction (E/C) sections within the monolithic structure to improve optical coupling and/or improve tap performance, illustrated in Figures 12A-B. Further embodiments of the present invention incorporate temperature as well as bias control to improve performance of exemplary monolithic transmissive active optical devices. Additional embodiments include methods of manufacture, and exemplary uses of devices of this type.

[0037] Although the exemplary embodiments below are mostly described in term of monolithic stabilized EAM's, it is understood by one skilled in the art that additional exemplary embodiments incorporating VOA's or SOA's may be designed and used in the same manner. The design and operation of a VOA is very similar to an EAM. Both VOA's and EAM's involve electrically controllable optical absorption within a reverse biased P-N junction, or a P-I-N single or multiple quantum well junction. The main difference is that an EAM uses a modulated voltage signal to rapidly shift the optical absorption between a minimum and a maximum value, thereby creating a modulated optical signal, and a VOA is desirably set to an intermediate absorption level using a DC bias. An SOA may also be formed similarly to an EAM or VOA, but with the junction forward biased to induce optical gain in the active material, rather than reverse biased to induce optical absorption. US Patent Application 10/056,929 to A. Bond is incorporated by reference for its teaching on the design and operation of EAM's.

[0038] An exemplary method of EAM operation involves setting a DC reverse bias on the junction so the center of the absorption curve of the device coincides with the desired wavelength to be modulated. An RF modulation signal may then be applied to modulate the absorption along the absorption curve.